ATTACHMENT A

Farming Emission Factor

The CA-GREET 3.0 default emission factor for soybean farming is a conservative value for soybean oil sourced from Argentina.

The soybean farming emissions in CA-GREET 3.0 has three components, farming energy, fertilizer and pesticide manufacturing emissions and nitrous oxide emissions. With the nitrous oxide emissions there are two components, the N_2O due to the decomposition of the synthetic fertilizer and the N_2O from the crop residues and the nitrogen fixed by the plant. The components are shown in the following table.

Component	gCO_2e/pound soybean
Farming energy	37.98
Fertilizer and pesticide manufacturing	20.00
N_2O from synthetic fertilizer	5.25
N_2O from crop residue and nitrogen fixation	102.88
Total	166.11

- Farming energy
    - The emission factor of 37.88 is conservative for Argentina soybean framing since no till agriculture is the dominant cropping system in Argentina and only 2.2% of the soybean growing region is irrigated vs. 10% in the U.S.
- Fertilizer and pesticide manufacturing and N_2O from synthetic fertilizer
    - Emission factors of 20.00 for "fertilizer and pesticide manufacturing" and 5.25 for "N_2O from fertilizer" are conservative because nitrogen fertilizer usage for soybean cultivation in Argentina is virtually zero vs. 6 kg/hectare in the U.S.[1]
- N_2O from crop residue and nitrogen fixation
    - This value should be the same for Argentina as it is in the U.S. because it relies on the IPCC Tier 1 emission factors and the quantity and composition of the soybean crop residues per unit of soybeans produced. These values are the same for Argentina and the U.S.

Crushing Emission Factor

- Using the Argentina energy use and the default oil content in the CA-GREET 3.0 model, the crushing emissions, after allocations, are 36.3 g CO2eq/pound of oil. This is compared to the CA-GREET 3.0 value of 59.1 g CO2eq/pound of oil, which was used, as a conservative value, in this fuel pathway.

[1] Global data on fertilizer use by crop and by country (datadryad.org)